

# Digital Signal Processing Assignment # 1

1. Determine whether each of the following signals is periodic. If it is, find the fundamental period.

(a)  $x(n) = \sin\left(\frac{\pi n}{4} + \frac{\pi}{8}\right)$

(b)  $x(n) = \sin\left(\frac{\pi n}{4} + \frac{\pi}{8}\right) + \cos\left(\frac{\pi}{3}n\right)$

(c)  $x(n) = \sum_{m=-\infty}^{\infty} \delta(n - 2m)$  (hint: try to sketch the signal)

(d)  $x(n) = \sum_{m=0}^{\infty} \delta(n - 2m)$

(e)  $x(n) = \sum_{m=-\infty}^{\infty} (-1)^m \delta(n - m)$

2. Determine if the following signals are energy signal or power signal or neither.

(a)  $x(n) = 2\left(\frac{1}{3}\right)^n, n > 0$

(b)  $x(n) = u(n)$

3. Consider a signal,  $x(n) = [-3, 1, \underset{\uparrow}{2}, -2, 3, -1]$ . Manually sketch the following signals

(a)  $x(n)$

(b)  $x(2 - n)$

(c)  $x\left(\frac{2}{3}n + 1\right)$